

CREW ENGINEERING
AND SURVEYING
5725 KEARNY VILLA ROAD, SUITE D
SAN DIEGO, CALIFORNIA 92123
(858) 571-0555

Preliminary Drainage Study Rua Michelle T.P.M.

Introduction

The proposed project, located at 25569 Rua Michelle in the Escondido area, is a subdivision of 5.68 gross acres in to four residential parcels of 1.29, 1.21, 1.07 and 2.11 acres each. The proposed parcels will be served by a private road. This is a lot sales project.

The existing topography of the site is moderately sloped. The westerly two-thirds of the property sheet flows to an existing drainage course that flows from north to south across the property. The easterly one third of the property drains via sheet flow to the east and south from an existing knob feature situated within the easterly one-third.

Grading has taken place on the property per County grading permit L-14349, that involved creating two non-structural pad areas, and the disposal of excess fill onsite.

This study is to estimate the developed runoff from the 100 year design event from and across the site and the surface drainage features that have been proposed to safely convey runoff and return it to sheet flow. The runoff exiting the site should remain the same following the development of this property.



ENGINEER OF WORK:
**CREW ENGINEERING
AND SURVEYING**

5725 KEARNY VILLA ROAD, SUITE D
SAN DIEGO, CALIFORNIA 92123
(858) 571-0555

Thomas H. Koerner 9/2011

THOMAS H. KOERNER, R.C.E. 65317
EXPIRES SEPTEMBER 30, 2013

SDC DPLU RCVD 01-04-12

TPM21192

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Methodology

The limits of the drainage basins were determined using County topographic maps at 1"=200' scale. A site inspection and survey was conducted to verify the drainage basin, flow patterns and existing downstream drainage facilities.

The Rational Method ($Q=CIA$) was used to calculate the runoff.

Intensity based on 100 year frequency storm.

Equation for determining the time of concentration (T_c):
 $T_c = T_i + T_t$; T_i from Table 3-2 and $T_t = [11.9 \times L^3 / H]^{0.385}$

Rational Method intensity calculation:

100 Year Frequency: $P_6 = 3.5"$ $P_{24} = 8.0"$ $P_6 / P_{24} = 44\%$;

Adjusted $P_6 = 45\% \times P_{24} = 3.6"$.

$D = T_c$, $I = 7.44 \times P_6 \times D^{-0.645}$

Pre-Development Drainage Basin Parameters

Basin	Length(mi)	Height (ft)	Ti (min)	Tt (min)	Tc (min)	C	I (in/hr)	Area (ac)	Q100(cfs)
A	0.11	72	6.9	2.3	9.2	0.32	6.40	4.1	8.4
B	0.03	19	6.9	0.9	7.8	0.32	7.12	0.7	1.6
C	0.02	14	6.9	0.6	7.5	0.32	7.30	0.5	1.2
D	0.05	21	8.0	1.5	9.5	0.54	6.26	0.4	1.4

Post-Development Drainage Basin Parameters

Basin	Length(mi)	Height (ft)	Ti (min)	Tt (min)	Tc (min)	C	I (in/hr)	Area (ac)	Q100(cfs)
A	0.11	83	11.5	2.2	13.7	0.40	4.95	4.1	8.1
B	0.04	26	11.5	1.1	12.6	0.38	5.23	0.7	1.4
C	0.02	9	6.9	0.5	7.4	0.32	7.36	0.5	1.2
D	0.05	21	8.0	1.5	9.5	0.55	6.26	0.4	1.4

Weighted Runoff Coefficient Calculation for Basin A, B & D:

$$C = 0.90 \times (\% \text{ Impervious}) + C_p \times (1 - \% \text{ Impervious})$$

Post-Development Basin A:

$$C = 0.90 \times (13\%) + 0.32 \times (1 - 13\%)$$

$$C = 0.40$$

Post-Development Basin B:

$$C = 0.90 \times (10\%) + 0.32 \times (1 - 10\%)$$

$$C = 0.38$$

Post-Development Basin D:

$$C = 0.90 \times (2.7\%) + 0.32 \times (1 - 2.7\%)$$

$$C = 0.55$$

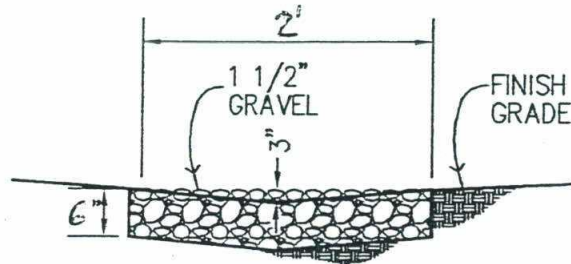
Conclusion

There will be no increase in runoff from the site due to construction of the project. Construction of the project will not result in any substantial erosion or detriment to downstream properties or drainage facilities. Energy dissipation devices are proposed, including rock filters around house pads, and rip rap sumps at the exit point of the pads and where runoff exits the driveways (see attached details). The drainage pattern of the site will not significantly change due to the construction of this project, and no drainage diversions will result from construction of the project as proposed.

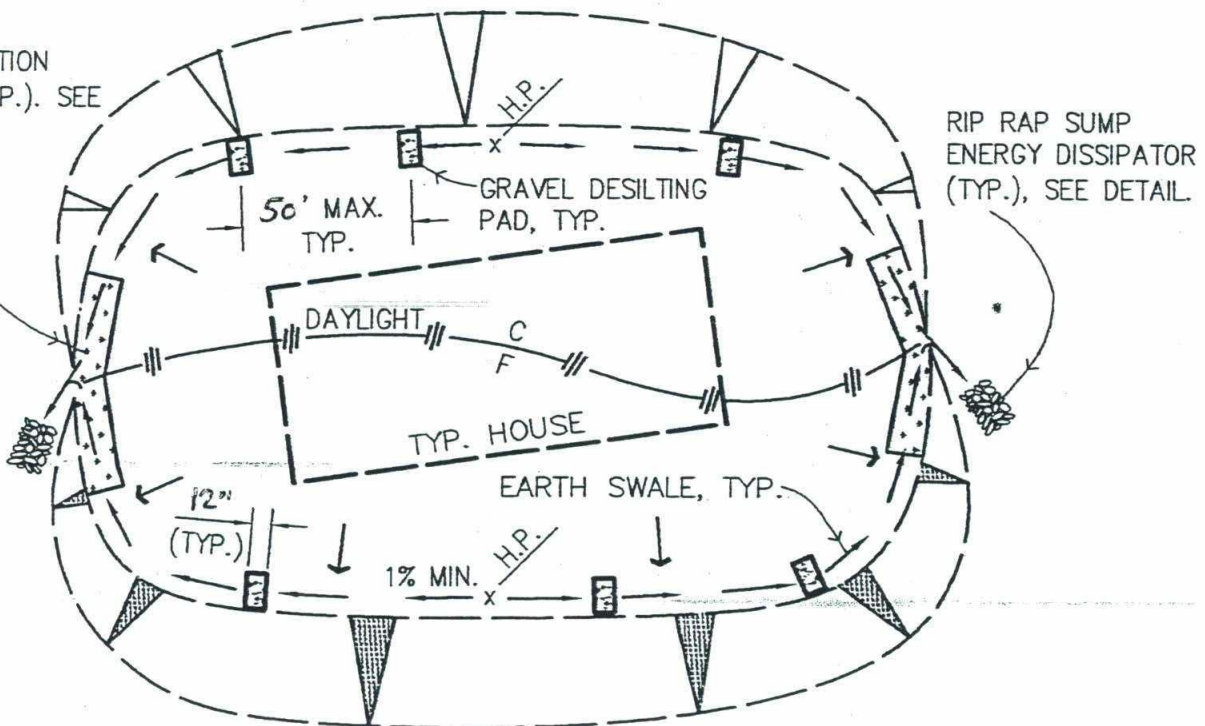
Energy dissipation devices should be proposed, including rock filters around house pads, and grass lined swales and rip rap sumps at the exit point of the pads and where runoff exits the driveways (see attached details).

NOTE:
INSTALL GRAVEL
DESILTING PADS IN
EARTH SWALE AT
50' MAX. O.C.

DETAIL OF GRAVEL DESILTING PAD



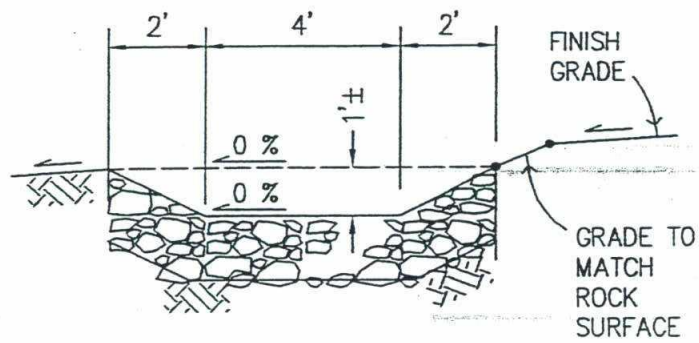
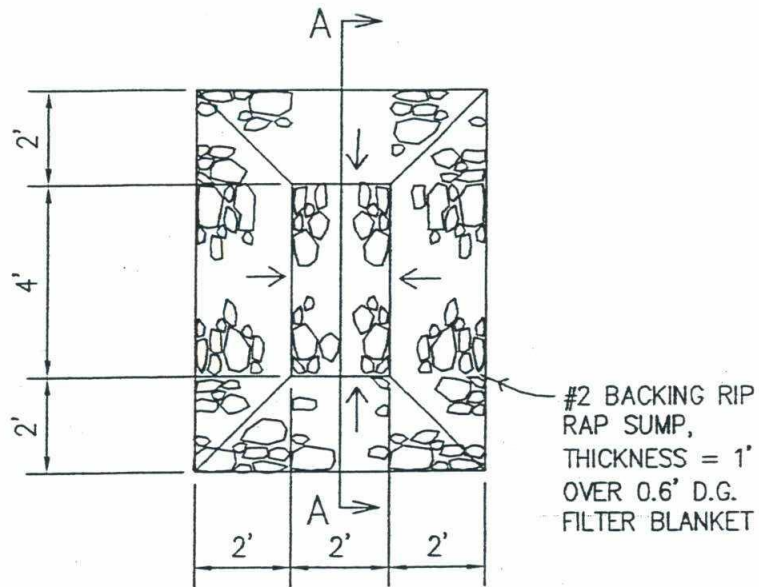
BIORETENTION
AREA (TYP.). SEE
DETAIL.



NOTE:
NO ROOF DRAIN PIPING OFF PAD. ALLOW WATER TO OVERLAND
FLOW FROM DOWNSPOUT/SPLASHBLOCK THROUGH YARD.

TYPICAL PAD DRAINAGE DETAIL

NO SCALE



RIP RAP SUMP AT PAD OUTLET

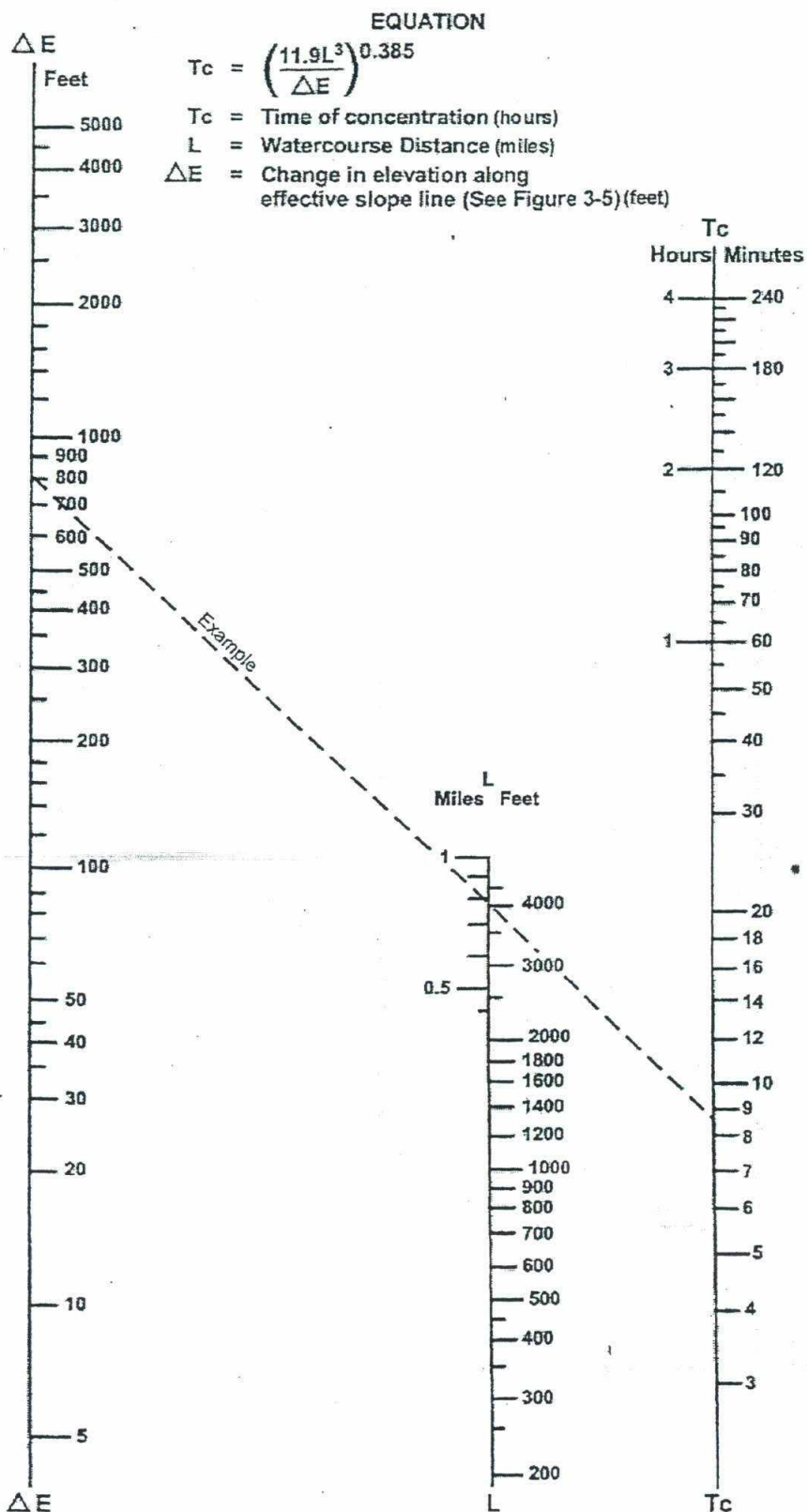
NOT TO SCALE

Table 3-2

**MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)**

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description



SOURCE: California Division of Highways (1941) and Kirpich (1940)

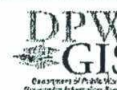
Nomograph for Determination of
Time of Concentration (T_c) or Travel Time (T_t) for Natural Watersheds

FIGURE

3-4

100 Year Rainfall Event - 6 Hours

..... Isopluvial (inches)



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3 0 3 Miles



County of San Diego Hydrology Manual



Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

..... Isopluvial (Inches)

**DPW
GIS**
Department of Public Works
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SanGIS
We Have San Diego Covered!

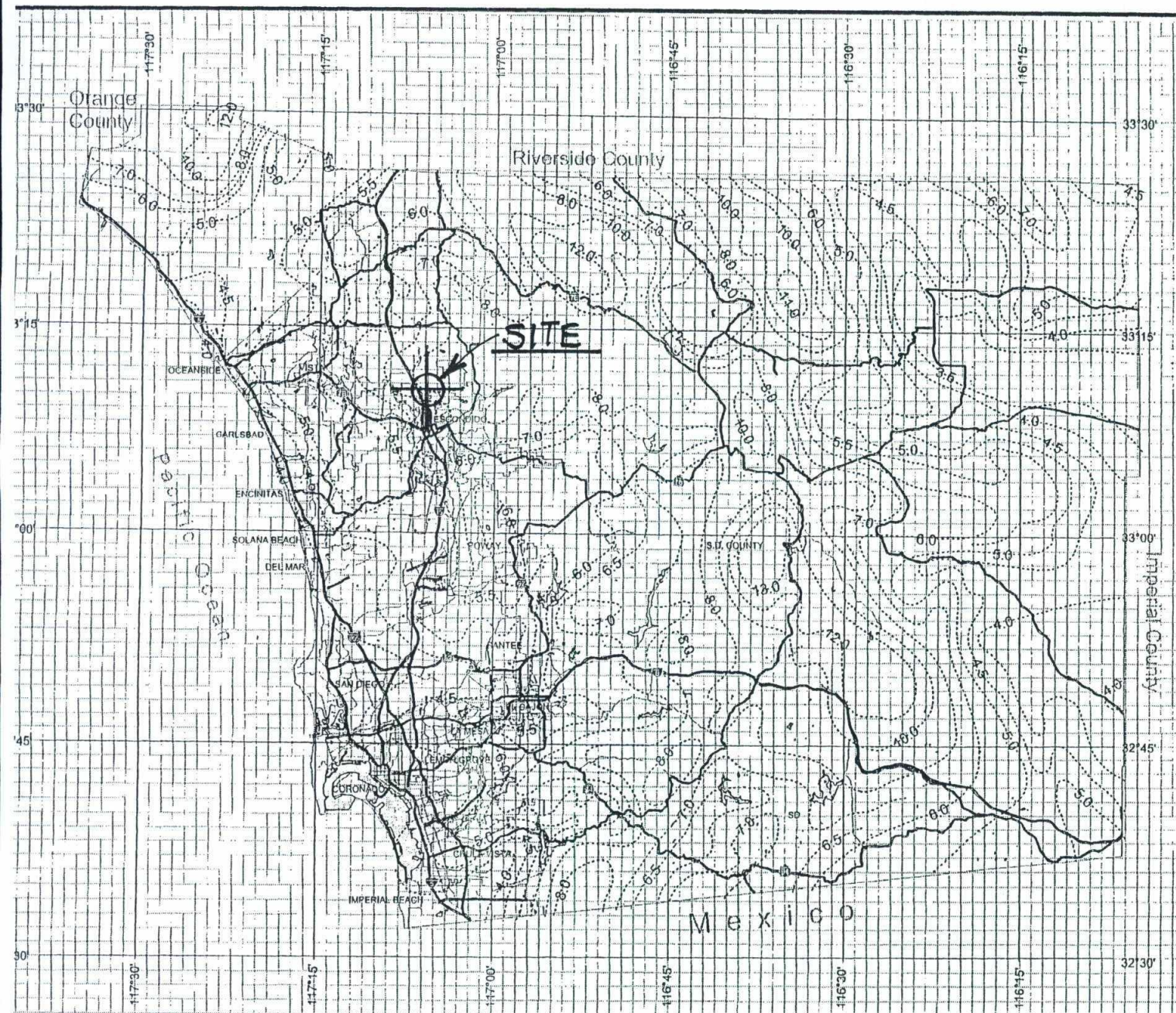


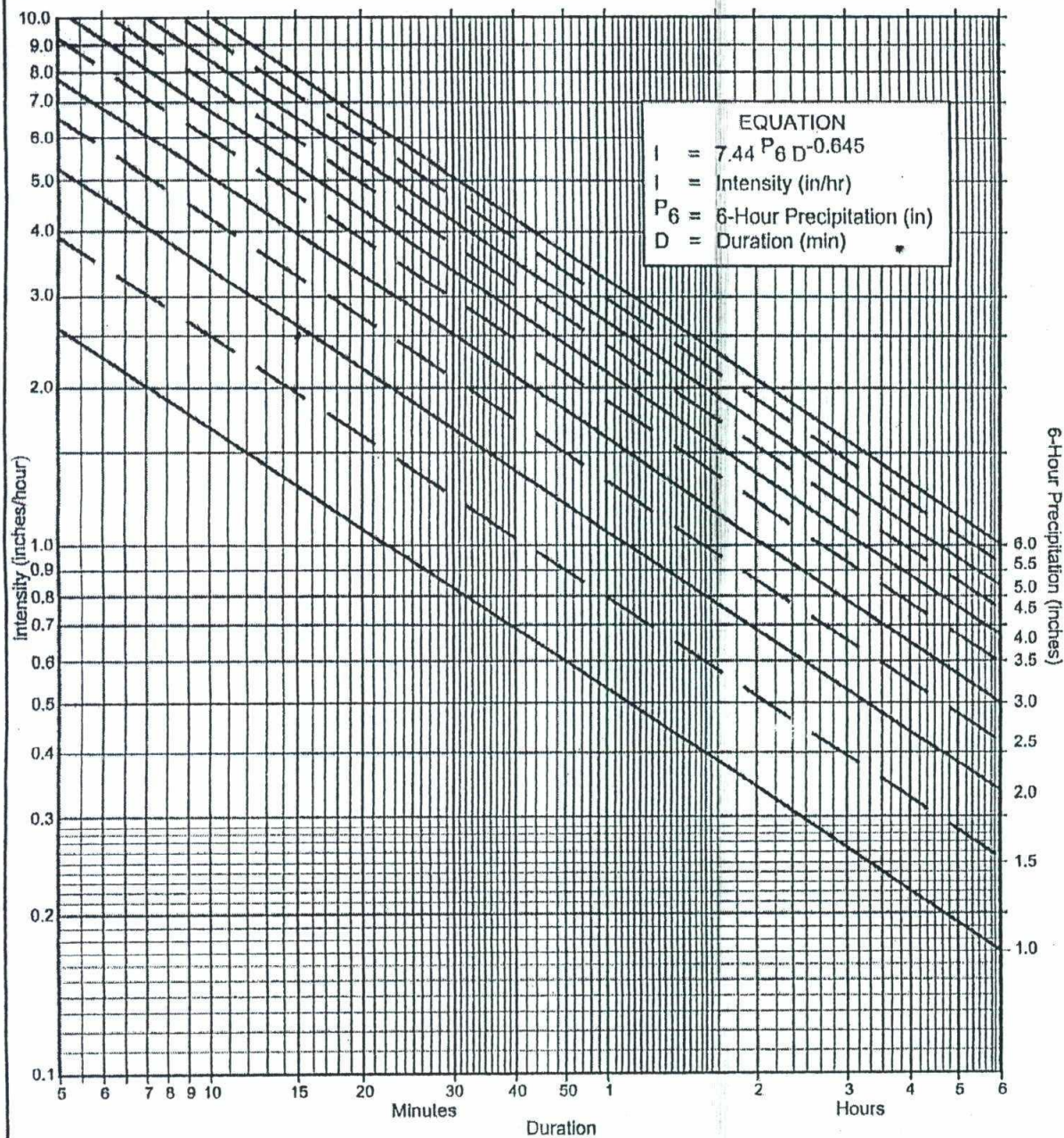
3 0 3 Miles

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Directions for Application:

- (1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).
- (2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).
- (3) Plot 6 hr precipitation on the right side of the chart.
- (4) Draw a line through the point parallel to the plotted lines.
- (5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

- (a) Selected frequency 100 year
 (b) $P_6 = 3.5$ in., $P_{24} = 8.0$, $\frac{P_6}{P_{24}} = 44$ %⁽²⁾
 (c) Adjusted $P_6^{(2)} = 3.6$ in.
 (d) $t_x =$ SEE CHART min.
 (e) $I =$ SEE CHART in./hr.

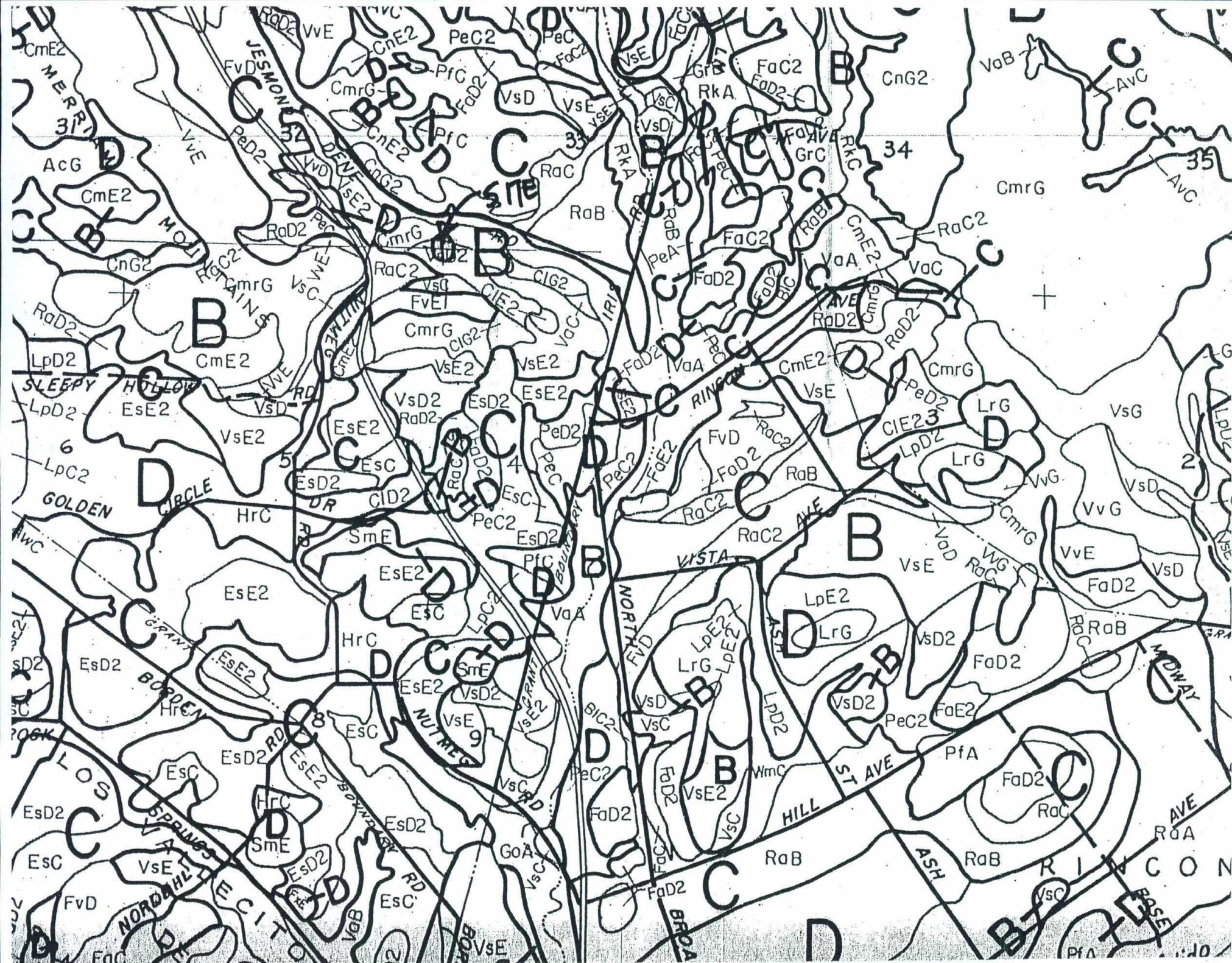
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P_6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.69	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE

3-1



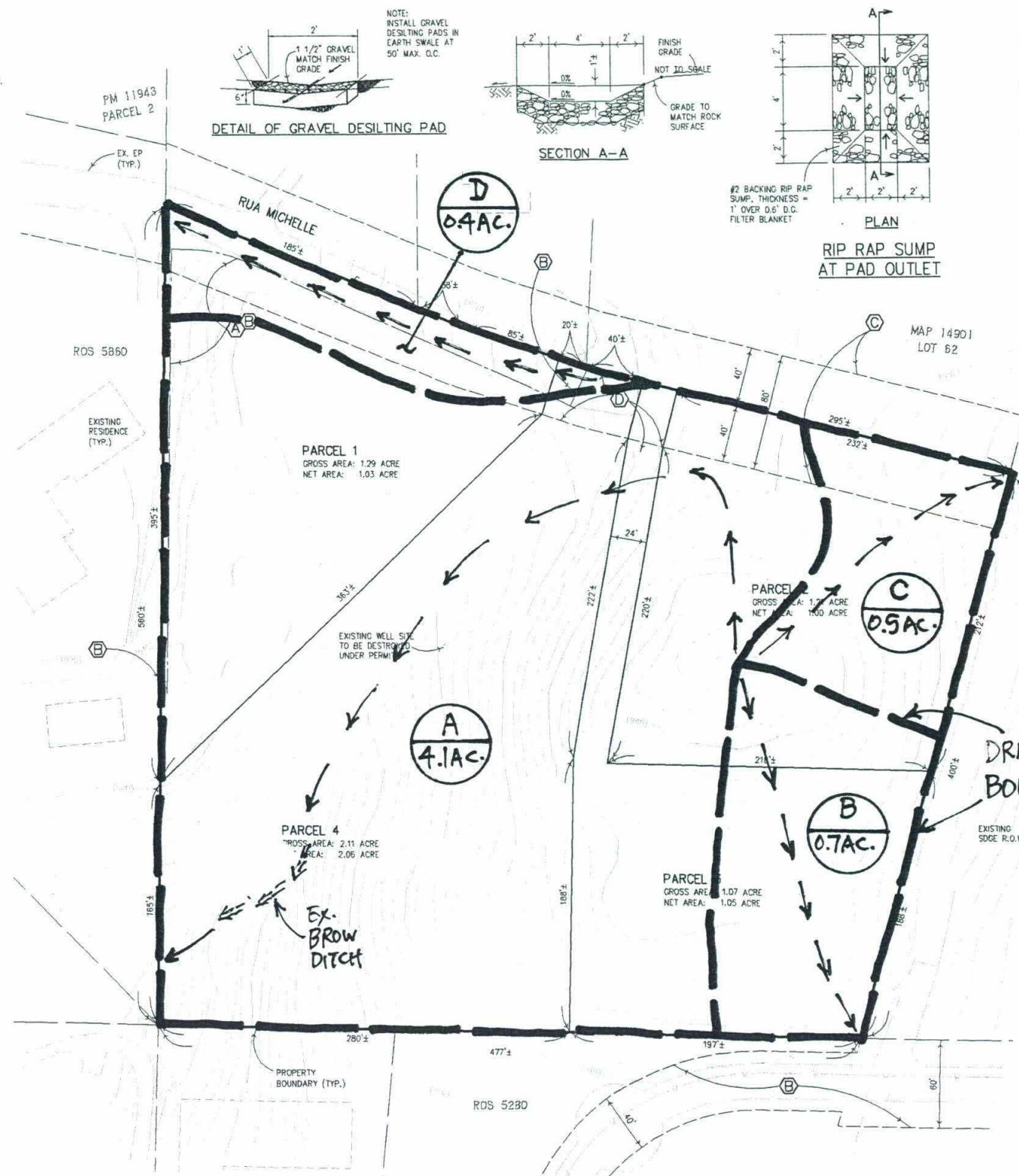
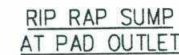
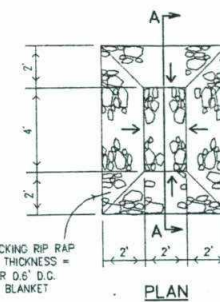
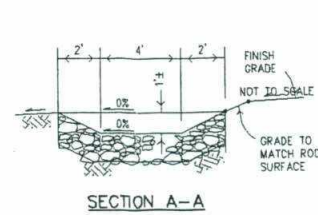
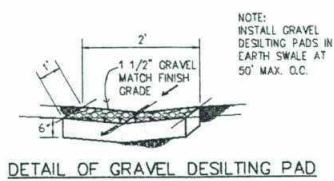
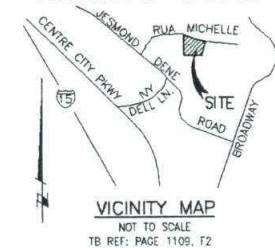
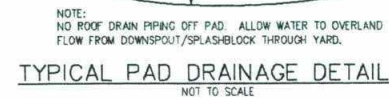
**Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS**

Land Use		Runoff Coefficient "C"				
NRCS Elements	County Elements	% IMPER.	Soil Type			
			A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, C_p , for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service



- A** CENTERLINE OF EXISTING 10' EASEMENT GRANTED TO SDG&E FOR PUBLIC POWER DOCUMENT RECORDED JULY 10, 1979 AS INSTRUMENT 79-284917 OF OFFICIAL RECORDS.
- B** CENTERLINE OF EXISTING 6' EASEMENT GRANTED TO PACIFIC TELEPHONE AND TELEGRAPH COMPANY PER DOCUMENT RECORDED JULY 13, 1979 AS INSTRUMENT 79-291402 OF OFFICIAL RECORDS.
- C** EXISTING EASEMENT FOR ROAD AND UTILITIES PURPOSES PER DOCUMENT RECORDED NOVEMBER 7, 1980 AS INSTRUMENT 80-376581 OF OFFICIAL RECORDS.
- D** EXISTING EASEMENT TO VALLEY CENTER WATER DISTRICT PER DOCUMENT RECORDED MAY 1, 2001 AS INSTRUMENT NO. 2001-0353529 OF OFFICIAL RECORDS.
- E** PROPOSED PRIVATE ROAD EASEMENT

LINAP 353 / UPM 451
 Approved
 Department of Environmental Health
 8/3/11
 Scientist Date

SCALE
1" = 100'

DRAINAGE BASIN
BOUNDARY (TYP.)

APPLICANT/OWNER:
SCSS DEVELOPMENT, LLC
C/O SALIM MIRO
12905 SEDGE COURT,
SAN DIEGO, CA 92129
PH. (858) 922-6424

PROJECT ADDRESS:
25569 RUA MICHELLE
ESCONIDO CA. 92026

APN:
187-520-11

LEGAL DESCRIPTION:
THAT PORTION OF THE E 1/2 OF THE
NE 1/4 OF SEC. 32 T11S, R2W, SBEM,
COUNTY OF SAN DIEGO, STATE OF CA,
ACCORDING TO OFFICIAL PLAT THEREOF

SOURCE OF EXISTING TOPOGRAPHY:
MARK HURD AERIAL SURVEY, INC.
PHOTOGRAPHY DATED 6-8-73

PREPARED BY:

CREW ENGINEERING
AND SURVEYING

5725 KEARNY VILLA ROAD, STE. "D"
SAN DIEGO, CA. 92123
(858) 571-0555

RONALD C. ASHMAN
RCE 34300 EXPIRES: SEPT. 30, 2011

[illegible]

PRE-DEVELOPED DRAINAGE MAP
25569 RJA MICHELLE

05580 BIA MICHELLE

DATE: 3/9/11

SCALE: 1"=40'

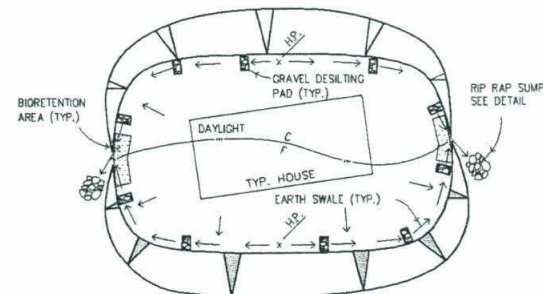
DRAWN: RO

APPROVED: RA

JOB: 1326

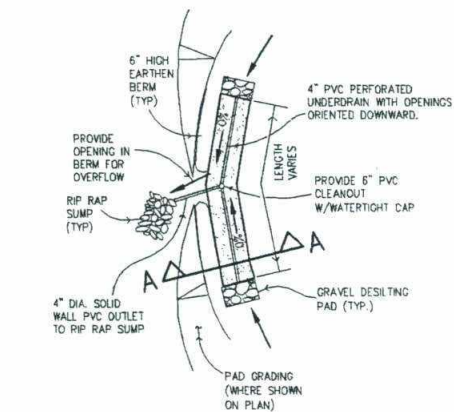
SHEET: 1 OF 1

J.N. 1326

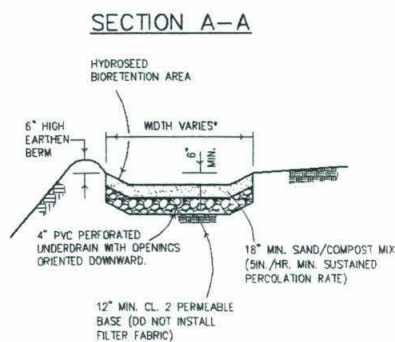


NOTE: NO ROOF DRAIN PIPING OFF PAD. ALLOW WATER TO OVERLAND FLOW FROM DOWNSPOUT/SPLASHBLOCK THROUGH YARD.

TYPICAL PAD DRAINAGE DETAIL
NOT TO SCALE

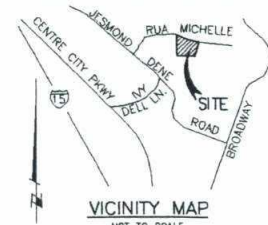


BIORETENTION AREA
NOT TO SCALE



SECTION A-A

JESMOND DENE

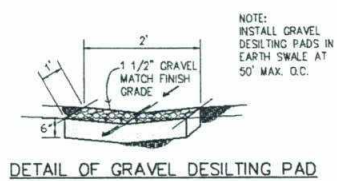


VICINITY MAP
NOT TO SCALE
TB REF: PAGE 1109, F2

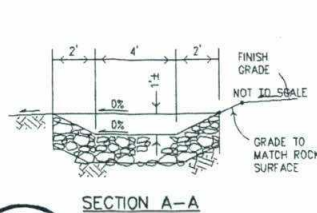
COUNTY NOTE:
THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMITS BEFORE COMMENCING SUCH ACTIVITY.

CONCEPT GRADING NOTE:
PAD AND DRIVEWAY GRADING IS PRESENTED FOR INFORMATION ONLY TO FACILITATE THE C.E.G.A. DISCLOSURE PROCESS. THE APPLICANT PROPOSES A LOT SALES PROJECT AND DOES NOT INTEND TO GRADE INDIVIDUAL BUILDING SITES. THE APPLICANT ACKNOWLEDGES THAT TRACT GRADING OF THE SITE MAY REDEFINE THE PROJECT AND MAY NECESSITATE ADDITIONAL PUBLIC REVIEW.

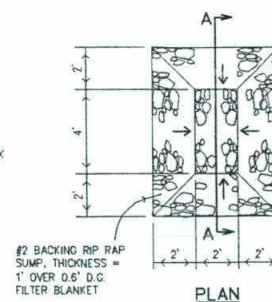
APPROXIMATE PAD/DRIVEWAY GRADING QUANTITIES:
EXCAVATION: 7130 C.Y.
EMBANKMENT: 7130 C.Y.
IMPORT/EXPORT: 0 C.Y.
MAXIMUM SLOPE HEIGHTS:
CUT: 12 @ 1-1/2:1
FILL: 12 @ 2:1



DETAIL OF GRAVEL DESILTING PAD



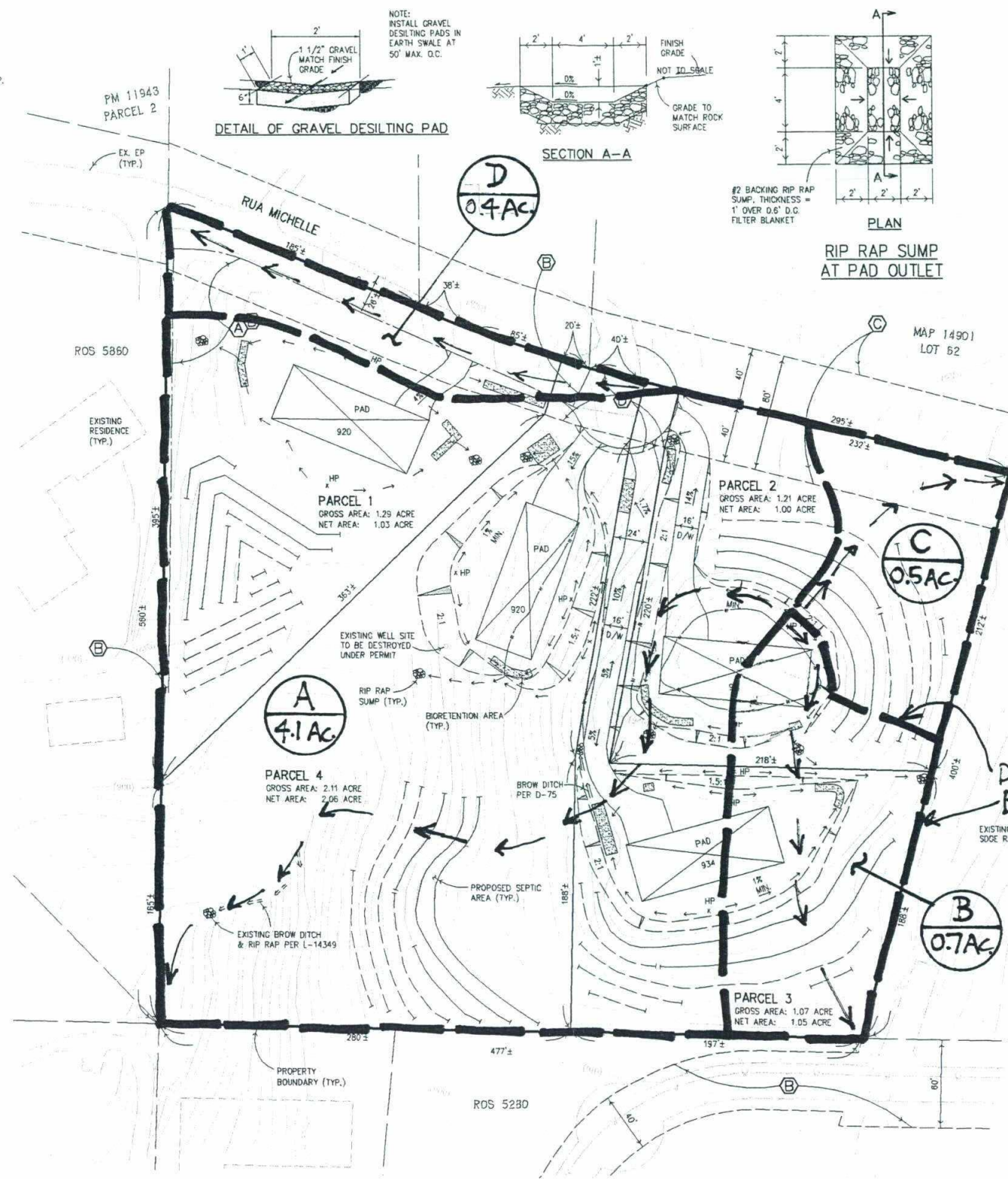
SECTION A-A



RIP RAP SUMP AT PAD OUTLET

- (A) CENTERLINE OF EXISTING 10' EASEMENT GRANTED TO SDG&E FOR PUBLIC PER DOCUMENT RECORDED JULY 10, 1979 AS INSTRUMENT 79-284917 OF OFFICIAL RECORDS.
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- (E) PROPOSED PRIVATE ROAD EASEMENT.

LINE 353 / URM 451
Department of Environmental Health
8/3/11



SCALE
1" = 100'

DRAINAGE BASIN BOUNDARY (TYP.)

APPLICANT/OWNER:
SCSS DEVELOPMENT, LLC
C/O SALIM MIRO
12905 SEDGE COURT
SAN DIEGO, CA 92129
PH. (858) 922-6424

PROJECT ADDRESS:
25569 RUA MICHELLE
ESCONDIDO CA 92026

APN:
187-520-11

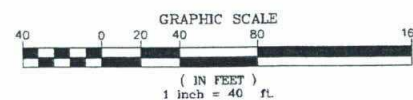
LEGAL DESCRIPTION:
THAT PORTION OF THE E 1/2 OF THE NE 1/4 OF SEC. 32 T11S, R2W, S8BM, COUNTY OF SAN DIEGO, STATE OF CA, ACCORDING TO OFFICIAL PLAT THEREOF

SOURCE OF EXISTING TOPOGRAPHY:
MARK HURD AERIAL SURVEY, INC.
PHOTOGRAPHY DATED 8-8-73

PREPARED BY:

CREW ENGINEERING AND SURVEYING
5725 KEARNY VILLA ROAD, STE. "D"
SAN DIEGO, CA 92123
(858) 571-0555

RONALD C. ASHMAN
RCE 34300 EXPIRES: SEPT. 30, 2011



REVISIONS	BY

POST-DEVELOPED DRAINAGE MAP

25569 RUA MICHELLE

DATE: 5/9/11
SCALE: 1"=40'
DRAWN: RO
APPROVED: RA
JOB: 1326
SHEET: 1 OF 1